

What is claimed is:

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Al*
1. A semiconductor device comprising:
 a semiconductor substrate,
 5 a semiconductor element which comprises;
 a first electrode provided on front plane of
 said semiconductor substrate, and a second electrode
 provided on rear plane of said semiconductor substrate,
 a first metallic member connected to said first
 10 electrode, and
 a second metallic member connected to said second
 electrode, wherein:
 said first electrode is connected to said first
 metallic member via a first metallic body including a first
 15 precious metal, and
 said second electrode is connected to said second
 metallic member via a second metallic body including a
 second precious metal .

- 20 2. A semiconductor device as claimed in claim 1,
 wherein:

a
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a surface portion of said first metallic member for
 connecting with *an* external line and a surface portion of said
 second metallic member are positioned at substantially *the*
 25 same level.

3. A semiconductor device as claimed in any of claims
 1 and 2, wherein:

said first metallic body is a projecting convex electrode terminal protruded from any of said first electrode and said first metallic member.

- 5 4. A semiconductor device as claimed in any of claims 1 and 2, wherein:

said first metallic body is plural projecting convex electrode terminals protruded from any of said first electrode and said first metallic member, and

- 10 said plural projecting convex electrode terminals are distributed on substantially whole bonding interface between said first electrode and said first metallic member with substantially same intervals.

- 15 5. A semiconductor device as claimed in any one of claims ~~from 1 to 4~~ ^{and 2}, wherein:

a precious metal layer is provided on ^a bonding surface of said first metallic member.

- 20 6. A semiconductor device as claimed in any of claims 1 and 2, wherein:

said second metallic body is a metallic layer positioned at the bonding interface between said second electrode and said second metallic member.

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7. A semiconductor device as claimed in claim 6, wherein:

^a said metallic layer is composed by bonding ^{to} each other

a precious metal layer positioned at the bonding front plane of said second electrode with a precious metal layer positioned at the bonding front plane of said second metallic member.

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8. A semiconductor device as claimed in claim 6, wherein:

said metallic layer is an alloy layer having a solidus line temperature ^{of} at least 400 °C, ^{and} which contains
 10 a precious metal as a main component.

9. A semiconductor device as claimed in claim 1, wherein:

said first metallic member comprises plural
 15 portions extended from a portion having a bonding portion with said first electrode, and
^{each}
~~respective~~ of said plural portions comprises a surface portion for connecting with an external line.

20 10. A semiconductor device as claimed in claim 3, further comprising:

an insulator for covering said semiconductor element and said first and second metallic members, wherein:

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 25 the plane of said first metallic member at ^a rear of the plane bonded with said first electrode comprises an exposed portion for connecting with an external line.

11. A semiconductor device as claimed in claim 10,
wherein:

said bonded plane of said semiconductor element is
a circuit forming plane, and said first electrode is a main
5 current electrode.

12. A semiconductor device as claimed in claim 6, further
comprising:

an insulator for covering said semiconductor
10 element and said first and second metallic members,
wherein:

the plane of said second metallic member at ^a rear of
the plane bonded with said second electrode comprises an
exposed portion for connecting with an external line.

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13. A semiconductor device comprising:

a semiconductor substrate,

a semiconductor element which comprises;

a first electrode provided on front plane of
20 said semiconductor substrate, and a second electrode
provided on rear plane of said semiconductor substrate,

a first metallic member connected to said first
electrode, and

a second metallic member connected to said second
25 electrode, wherein:

said second electrode is connected to said second
metallic member via a metallic layer containing precious
metal, and

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said metallic layer is composed by bonding each other
a precious metal layer provided at the bonding front plane
of said second electrode with a precious metal layer
provided at the bonding front plane of said second metallic
5 member.

14. A semiconductor device comprising:

a semiconductor substrate,

a semiconductor element which comprises;

10 a first electrode provided on front plane of
said semiconductor substrate, and a second electrode
provided on rear plane of said semiconductor substrate,

a first metallic member connected to said first
electrode, and

15 a second metallic member connected to said second
electrode, wherein:

said second electrode is connected to said second
metallic member via a metallic layer containing precious
metal, and

20 said metallic layer is an alloy layer having a
solidus line temperature at least 400 °C, which contains
a precious metal as a main component.

15. A semiconductor device comprising:

25 a semiconductor substrate,

a semiconductor element which comprises;

a first electrode provided on front plane of
said semiconductor substrate, and a second electrode

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provided on rear plane of said semiconductor substrate,
a first metallic member connected to said first
electrode, and

a second metallic member connected to said second
5 electrode, wherein:

said first metallic member comprises plural
portions extended from a portion having a bonding portion
with said first electrode, and

respective of said plural portions comprises a
10 surface portion for connecting with an external line.

16. A semiconductor device as claimed in any of claims
1 and 2, wherein:

said second electrode provided on the rear plane of
15 said semiconductor substrate is formed by metalizing said
semiconductor substrate after grinding.

17. A semiconductor device as claimed in any of claims
1 and 2, wherein:

a 20 at least one of said first and second metallic bodies
a pads is composed of a solder having a melting point at least
250 °C.

18. A method for manufacturing said semiconductor
25 device claimed in claim 1, wherein:

a bonding operation for bonding said first
electrode with said first metallic member of said
semiconductor is performed simultaneously with or prior

to a bonding operation for bonding said second electrode with said second metallic member of said semiconductor.

19. A semiconductor device comprising:

a semiconductor chip, and

a metallic member connected to chip electrode,

wherein:

said chip electrode is composed of any of Al film and an Al alloy film,

10 a bonding front plane of said metallic member is composed of plated precious metal film,

said chip electrode is bonded metallicity to said metallic member via Au bumps, and

15 said Aluminum film of more than 80 % in area of Au/Al bonding region is made all an Au/Al alloy layer in the thickness direction.

20. A semiconductor device comprising:

a semiconductor chip,

20 a first metallic member connected to chip rear plane electrode,

a second metallic member connected to a main current electrode on a circuit forming plane of the chip, and

25 a third metallic member connected to a control electrode, wherein:

said main current electrode and said control electrode are composed of any of Al film and an Al alloy film,

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plural Au bumps are formed on respective of Al electrode film in a metallically bonded condition, respective of said second and third metallic members, which is plated with precious metal, has such a structure that said metallic member is bonded with said Au bumps by compression bonding, and gaps between said metallic member and said chip are filled with resin, and a plane of said first metallic member opposite to said chip in the plane of chip projection, and planes of said second and third metallic members opposite to said chip are exposed to the surface of said semiconductor device.

21. A semiconductor device comprising:

15 a semiconductor chip, and
a metallic member connected to ^achip electrode, wherein:

precious metal particles, having a particle diameter larger than a gap between said chip and said metallic member, and ^aresin are filled into said gap, and ~~such a structure is composed that~~ precious metal bumps, having a bump diameter larger than said gap between said chip and said metallic member, and resin are filled into said gap between said chip and said metallic member.

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22. A semiconductor device as claimed in claim 21, wherein:

^{each}
~~respective~~ of said precious metal particles, said

a metallic member, and said electrode; and said precious metal bumps, said metallic member, and said electrode; are bonded metallically^{to} each other.

5 23. A semiconductor device comprising:

a semiconductor chip, and

metallic members connected to chip electrodes,

wherein:

main mechanical bonding between said metallic

10 members ^{is} ~~are~~ performed via said chip.

24. A semiconductor device comprising:

a semiconductor chip,

metallic members connected to chip electrodes, and

15 resin filled into a gap between said chip and said metallic members, wherein:

said metallic member is manufactured to have any of bumps and dips, and openings, for composing a mechanically bonded structure with said resin.